IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

AMERICAN PATENTS LLC, Plaintiff, v. XEROX CORPORATION and DAHILL OFFICE TECHNOLOGY CORPORATION D/B/A XEROX BUSINESS SOLUTIONS SOUTHWEST, Defendants.	CIVIL ACTION NO. 6:21-cv-638-ADA **<u>JURY TRIAL DEMANDED</u>**

AMERICAN PATENTS' RESPONSIVE CLAIM CONSTRUCTION BRIEF

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I.   INTRODUCTION

American Patents accuses Xerox of infringing four patents: U.S. Patent Nos. 6,847,803 (the "'803 Patent"), 7,088,782 (the "'782 Patent"), 7,310,304 (the "'304 Patent"), and 7,706,458 (the "'458 Patent"). The latter three—the Mody Patents—are part of the same family.

The parties have narrowed their claim-construction disputes to four terms (or sets of terms).[1] Two of those are similar enough that American has grouped them together below.

The sole dispute for the '803 patent concerns the term "information." American proposes that "information" be construed as "payload signal(s)." Xerox disagrees, contending that "information" includes not just payload signals but also non-payload signals like control signals. But Xerox's overly expansive reading of "information" would exclude the patent's preferred embodiment. And it contradicts the ordinary meaning of "information" in the art—including the meaning shown by the patents of Xerox's claim construction expert, Mr. Proctor.

As to the Mody Patents, the parties agree that the first two disputed terms should bear their plain and ordinary meaning. Yet Xerox believes the jury must be provided with its definitions of those meanings because the terms are "highly technical." Xerox is wrong, and the extraneous verbiage it proposes would not help the jury understand these terms.

Last, Xerox asserts that the "coarse" and "fine" time synchronization terms are indefinite. Xerox says that "coarse" and "fine" are "terms of degree," and the patents "provide[] no objective boundary to determine whether a particular time synchronization is coarse or fine." But relative terms or terms of degree are not indefinite when a person skilled in the art would

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[1] To reduce the terms in dispute, American has informed Xerox that American will no longer assert in this case three dependent claims: claims 44 and 51 of the '782 Patent and claim 7 of the '304 Patent. Those were the only asserted claims in which the terms "resembles an existing space-time block code" and "resembling an existing space-time block code" appeared. Xerox's arguments concerning those terms (Opening Br. at 22-26) are thus moot.

understand what is claimed with reasonable certainty. Here, a POSITA would readily

understand that coarse" and "fine" are relative modifiers that distinguish the more accurate of

two time-synchronization steps or circuits ("fine time synchronization") from the less accurate

step or circuit ("coarse time synchronization"). That conclusion is confirmed by the intrinsic and

extrinsic evidence—including, once more, Mr. Proctor's own patents.

The Court should thus adopt American's proposed constructions and reject Xerox's

proposed constructions.

II.   BACKGROUND

A.   The '803 Patent

The '803 Patent (U.S. Pat. No. 6,847,803) teaches and claims methods and systems

related to reducing interference in a wireless communications receiver with at least two antennas.

Figure 3 shows an exemplary wireless communications device with such a receiver:
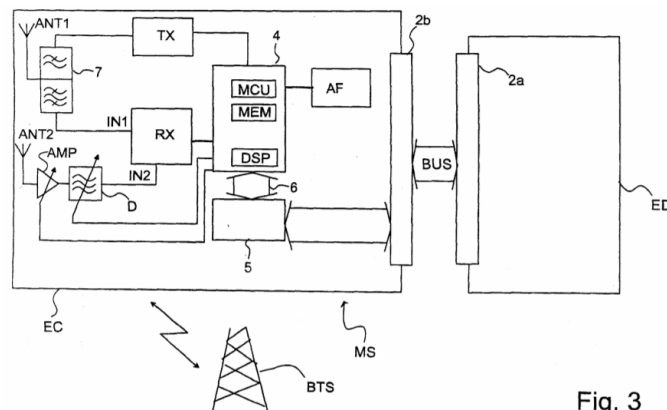
Fig. 3

The receiver in a wireless communications device may be subject to undesirable

interference signals that decrease the receiving capacity of the receivers. Ex. P1, '803 Patent at

1:19-24. Particularly, antennas ANT1 and ANT2, shown for example in Figure 3, may be

exposed to interference signals from electrical devices such as data processors connected to the

communications devices as well as from other communications devices. *Id*. at 1:19-24, 5:49-52.

The '803 Patent discloses a way to reduce the effects of that undesirable interference: (1)

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forming a reference signal that represents the interference and (2) using that reference signal to tune the receiver to reduce interference. *Id*. at 3:16-18. The reference signal is formed at times when no payload information is being received. *Id*. This is advantageous because the reference signal can more accurately represent only interference, so the tuning of the receiver does not reduce reception of payload information. *Id*. at 3:16-18, 8:16-19.

B.   The Mody Patents

The Mody Patents (U.S. Pat. Nos. 7,088,782 ("the '782 Patent"), 7,706,458 ("the '458 Patent"), and 7,310,304 ("the '304 Patent")) teach and claim methods and apparatuses related to wireless communication using Orthogonal Frequency Division Multiplexing (OFDM) and/or Multi-Input, Multi-Output (MIMO) technologies. In an OFDM scheme, multiple signals are simultaneously transmitted over sub-channels of a frequency spectrum. Ex. P2, '782 Patent at 1:19-38. The sub-channels are spaced apart by precise frequency differences in a way that makes them orthogonal to each other. *Id*. In a MIMO scheme, multiple transmitting antennas and multiple receiving antennas are used to transmit and receive data. *Id*. at 1:42-46. Combining the OFDM and MIMO transmission schemes results in information being transmitted over three dimensions: space (multiple antennas), time, and frequency (multiple sub-channels of a frequency spectrum). *Id*. at 10:31-33. This combination allows for an increased capacity of transmitted and received data over the same bandwidth as a system with a single transmit antenna and a single receive antenna. *Id*. at 1:42-46. As in all communications, synchronization is critical to MIMO OFDM systems. *Id*. at 2:19-22. And MIMO OFDM systems must be synchronized in both time and frequency. *Id*. Channel parameters should also be estimated in such a system. *Id*. at 1:64-2:6.

The Mody Patents provide solutions to the issues of synchronization and channel parameter estimation as part of an overall MIMO OFDM system. *Id*. at 2:39-42. As shown in

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Figure 1, communication system 6 includes a transmitter 8 that transmits signals across the wireless channel 19 to a receiver 10 that receives the transmitted signals:


FIG. 1
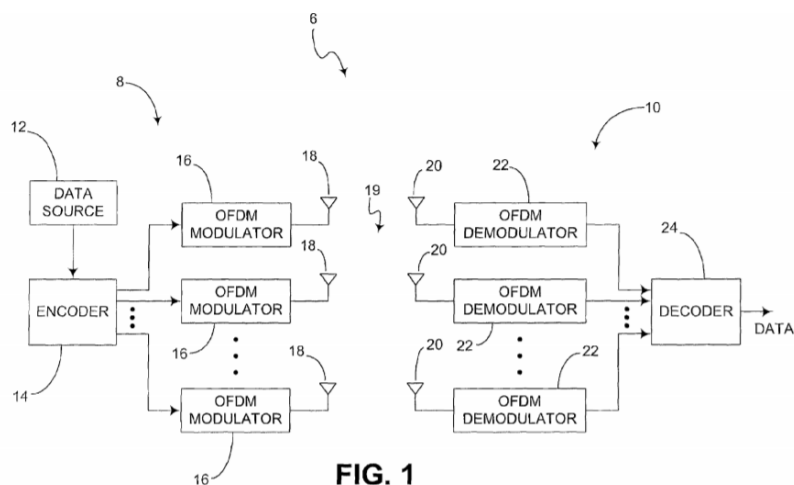
On the transmitter side, data from data source 12 is passed to an encoder 14. *Id*. at 1:65-67. Encoder 14 encodes the data for space-time processing and to prepare for OFDM modulation and separates the data onto multiple transmit diversity branches (TDBs). *Id*. at 4:2-5. Each TDB has one OFDM modulator 16 and one antenna 18. *Id*. at 4:22-24. OFDM modulator 16 modulates frames of data at specific sub-carrier frequencies per the OFDM scheme. *Id*. at 4:24-27. Each TDB then transmits the modulated data over the channel 19 using its own antenna 18. *Id*. The total number of OFDM modulators 16 and transmitting antennas 18 may be represented by the variable "Q." *Id*. at 4:22-24.

On the receiver side, a number of receiving antennas, represented by the variable "L," receive the transmitted signals. *Id*. at 4:28-31. Those signals are demodulated using L OFDM demodulators 22. *Id*. The demodulated signals are then sent to decoder 24, which combines the signals and decodes them. *Id*. at 4:35-39. Decoder 24 outputs the original data that was sent from data source 12. *Id*.

Figure 2 shows additional detail regarding the encoder 14 of transmitter 8:
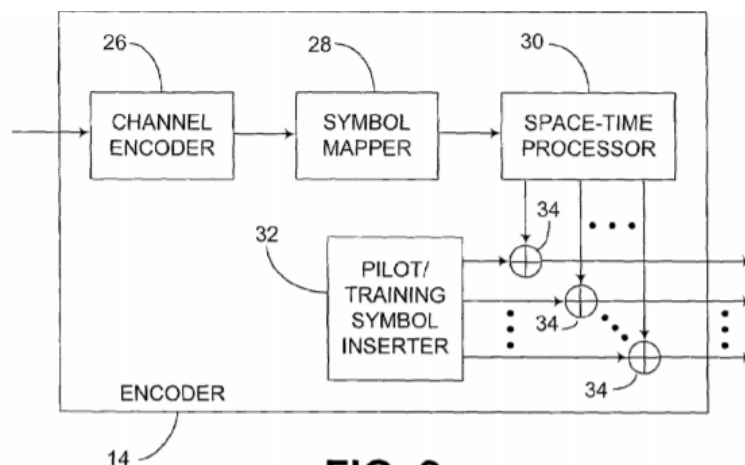
FIG. 2

Encoder 14 includes channel encoder 26, which encodes incoming data to produce channel encoded data using a scheme recognized by the decoder 24 of the receiver 10. *Id*. at 5:38-45. Symbol mapper 28 then maps the channel-encoded data into data symbols and lays out a stream of data symbols within the structure of a frame. *Id*. at 5:47-53. Space-time processor 30 processes and encodes that frame of data symbols in a way that can be decoded by receiver 10 and outputs the processed symbols over the respective TDBs. *Id*. at 5:54-67. Pilot/training symbol inserter 32 provides pilot symbols and training symbols that are inserted into the frames on the TDBs. *Id*. at 6:1-5. The pilot/training symbol inserter 32 inserts a "preamble." *Id*. at 6:8-15. The preamble consists of a training symbol structure that is a continuous burst of symbols. *Id*. This preamble is preferably inserted at the beginning of each frame. *Id*.

At each TDB, the processed symbols, along with any preamble, pilot symbol, or training symbol structure added by the pilot/training symbol inserter 32, are sent to OFDM modulator 16. *Id*. at 7:35-39. The OFDM modulator 16 of transmitter 8 is shown in additional detail in Fig. 3:
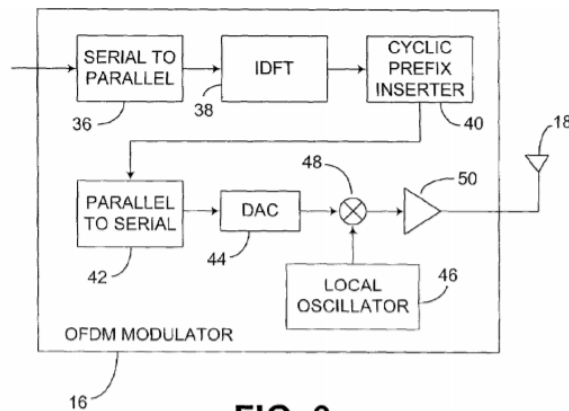
FIG. 3

The signals output from the encoder are input into a serial to parallel converter 36, which takes N

symbols (where N is the "blocksize" of the OFDM symbol) received in serial format and

converts them into a parallel format. *Id*. at 7:47-56. Those N parallel symbols are then

transformed into time domain symbols (samples) by Inverse Discrete Fourier Transform (IDFT)

stage 38. *Id*. Cyclic prefix inserter 40 inserts an additional number of samples, G, for every N

samples. *Id*. at 8:1-29. These additional samples are known as guard intervals, which are used

to eliminate Inter Symbol Interference. *Id*. The G+N samples, referred to by the patent as an

"OFDM symbol," are converted from parallel to serial by parallel to serial converter 42 and then

converted to analog signals by digital to analog converter (DAC) 44. *Id*. The local oscillator 46

then provides a signal with the carrier frequency, which is mixed with the analog signals by

mixer 48. *Id*. The frame is then amplified by amplifier 50 before being sent across the channel

19 by antenna 18. *Id*. at 8:30-32. An example frame transmitted across channel 19 is shown in

Figure 4.

Referring back to Figure 1, the L receiving antennas 20 of receiver 10 receive the

transmitted signals from transmitter 8. *Id*. at 4:28-39. Those signals are first sent to OFDM

demodulator 22 for demodulation and then sent to decoder 24, which outputs the data in the

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same form as it was in data source 12 before it was sent. *Id*. The OFDM demodulator 22 of

receiver 10 is shown in additional detail in Figure 7:

FIG. 7
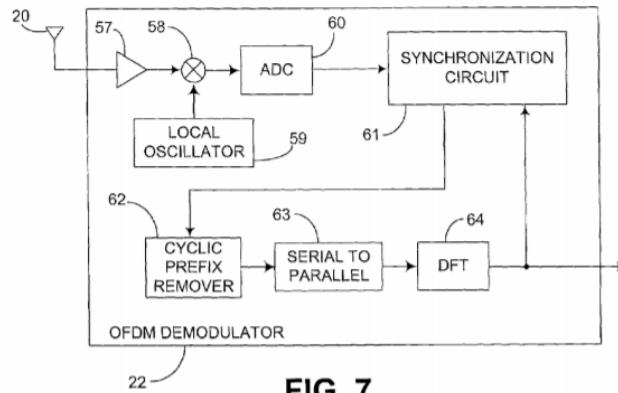
Signals sent across the channel 19 are received by antenna 20 and then amplified by pre-

amplifier 57. *Id*. at 12:9-20. The local oscillator 59 then provides a signal with the frequency

desired to demodulate the signal, which is mixed with the received signals by mixer 58. *Id*. The

signals are then converted into discrete time samples by analog to digital converter 60. *Id*. The

discrete time samples are sent to synchronization circuit 61, where both time and frequency

synchronization is performed. *Id*.

Synchronization circuit 61 is illustrated in detail in Figure 8:

FIG. 8

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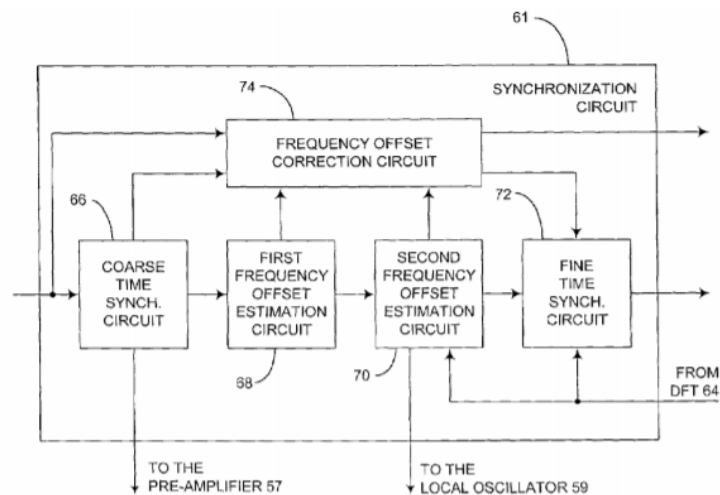
The input discrete time samples are sent to the coarse time synchronization circuit 66 and to the frequency offset correction circuit 74. *Id*. at 12:52-65. Coarse time synchronization circuit 66 "determines the approximate start time of each received block of samples by estimating the approximate start time of the OFDM frame." *Id*. Those coarsely synchronized signals are sent to a first frequency offset estimation circuit 68, to frequency offset correction circuit 74, and to pre-amplifier 57. *Id*. The first frequency offset estimation circuit 68 "estimates the frequency offset to within one-half of the sub-carrier spacings." *Id*. at 12:66-13:1. Output from that circuit is sent to second frequency offset estimation circuit 70 as well as to frequency offset correction circuit 74. *Id*. at 13:1-3, 13:21-25. The second frequency offset estimation circuit 70 uses (1) the estimation of the frequency offset to within one-half of the sub-carrier spacing (received from first frequency offset estimation circuit 68), and (2) frequency domain samples (received from DFT 64), to provide an estimation of the frequency offset to an integer multiple of the sub-carrier spacings. *Id*. at 13:25-28. Output from the second frequency offset estimation circuit 70 is passed to the frequency offset correction circuit 74, the fine time synchronization circuit 72, and to the local oscillator 59. *Id*. at 13:29-37. The frequency of local oscillator 59 is then adjusted to the frequency of the local oscillator 46 of the transmitter 8. *Id*. Fine time synchronization circuit 72, which receives output from both the second frequency offset estimation circuit 70 and from the frequency offset correction circuit 74, calculates a more accurate start time of the received frame. *Id*. at 13:37-40.

Referring back to Figure 7, outputs from the synchronization circuit 61 are sent to cyclic prefix remover 62, which removes the cyclic prefixes inserted between each block of N symbols. *Id*. at 13:9-12. Those blocks are converted to parallel form using serial-to-parallel converter 63, and those parallel signals are input to the DFT stage 64, which converts the time domain samples

back to the frequency domain. *Id*. at 13:12-18. The demodulated symbols are then input into

decoder 24, which is shown in Figure 13:
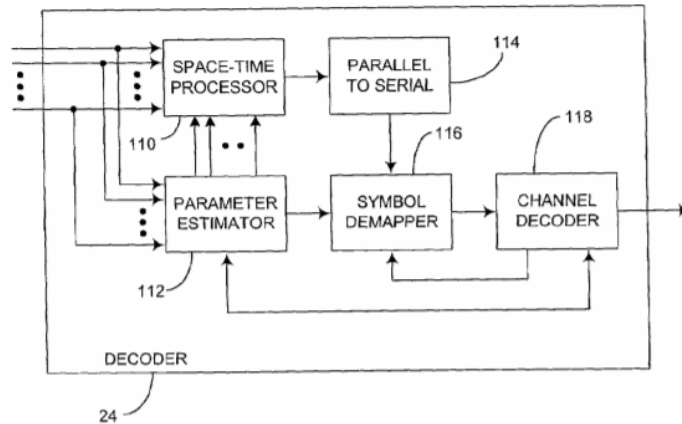
FIG. 13

As shown, the demodulated symbols from the multiple TDBs are input into both space-time

processor 110 and parameter estimator 112. *Id*. at 18:23-28. Once the channel parameters are

estimated, the space-time processor 110 takes the demodulated symbols from the multiple TDBs

and processes them into sets of parallel data. *Id*. at 18:29-35. That data is converted to serial form

by parallel to serial converter 114 and then sent to symbol demapper 116 and finally channel

decoder 118, which detects and corrects errors in the data and outputs it in its original form. *Id*.

The '782 Patent, the '458 Patent, and the '304 Patent are more specifically directed to

aspects of training symbols structures used in time and frequency synchronization in OFDM and

MIMO systems. Particularly, these patents disclose the use of coarse time synchronization, fine

time synchronization, and estimation of a frequency offset (frequency synchronization). Ex. P2,

'782 Patent at 12:52-13:45. Such synchronization is accomplished using a preamble (or training

symbol structure) with structure embedded that enables efficient synchronization in time and

frequency. *Id*. at 2:39-42. For example, a training symbol structure such as that shown in Equation

1, which is the Alamouti code for a 2x2 MIMO system (two transmitters and two receivers), is

orthogonal:

$$S_k = \begin{bmatrix} S_{1,k} & S_{1,k} \\ -S_{1,k}^* & S_{1,k}^* \end{bmatrix}, \qquad (1)$$

Id. at 11:6-20. Orthogonal matrices simplify auto-correlation and cross-correlation procedures, which are used in the time and frequency synchronization disclosed in the patents. *Id.* at 17:19-24. This training symbol structure can be a directly modulatable training sequence, making it practical for use in OFDM systems. *Id.* at 6:44-51. Time and frequency synchronization is performed through the use of auto-correlation and cross-correlation techniques, techniques which take advantage of these properties. *Id.* at 14:13-53, 15:48-16:20, 17:1-24, 17:53-55.

The training symbols may also be designed and adjusted to maintain "a constant amplitude at the output of each sub-channel" to accommodate amplitude differences between the sub-channels. Ex. P3, '304 Patent at 6:15-20. The cyclic prefixes inserted in the training symbol structure may be increased to a length greater than the maximum time delay of a transmitted symbol in order to eliminate inter-symbol interference (ISI). *Id.* at 8:8-16.

III.   AGREED TERMS

The parties have agreed that the preambles listed in Ex. P18 are limiting preambles.[2]

IV.   DISPUTED TERMS

A.   The '803 Patent

1.   "information" / "when no information is being received"

Disputed Term	American's Construction	Xerox's Construction
information / when no information is being received	payload signal(s) / when no payload signal(s) is/are being received	No construction necessary

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[2] As discussed below, the construction of the "Multi-Input Multi-Output (MIMO) . . . system" portion of the preambles containing that term is disputed.

(Claim 1 of the '803 Patent) [3]		

The term "information" / "when no information is being received" should be given the plain and ordinary meaning revealed through the term's consistent usage in the specification, file history, and in the art: "payload signal(s)."   Xerox, however, says that the term "information" needs no construction. But in arguing against American's proposal, Xerox asserts that "information" covers not only payload signals, but non-payload signals such as control signals as well. Opening Br. at 2-7. Xerox is wrong. Not only is Xerox's view of "information" incompatible with the preferred embodiment, but it is also contradicted by the patents of Xerox's own expert.

a.   *The intrinsic evidence shows that the ordinary meaning of "information" in this context is "payload signal(s)"*

The intrinsic evidence shows that the plain and ordinary meaning of "information" in the 803 patent is "payload signal(s)." The term "information" / "when no information is being received" appears in asserted claim 1 of the '803 patent, as well as in other unasserted claims. Claim 1 reads:

> 1. A method for reducing interference in a receiver for receiving information in receiving time slots, in which receiver signals are received with at least a first antenna (ANT1) and a second antenna (ANT2), characterized in that, on the basis of signals received with said first antenna (ANT1) and second antenna (ANT2) at moments of time other than in said receiving time slot, ***when no information is being received***, a reference signal representing interference in said other time slot is formed and used for the tuning of the receiver in said receiving time slots.

Ex. P1, '803 Patent, Cl. 1 (emphasis added).

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[3] References to claims numbers in the disputed term column are to the asserted claims in which the relevant term appears.

Important to understanding what "information" means in this context is the fact that claim 1 distinguishes between "receiving time slots" and other "moments in time." The claim recites a method for reducing interference in a receiver "for receiving information in receiving time slots." *Id*. Claim 1 then provides that a reference signal is formed "at moments of time ***other than*** in said receiving time slot, ***when no information is being received.***" *Id.* Information, therefore, is something that the receiver receives during receiving time slots, but not during at least some moments in time outside of the receiving time slot.

Figure 2 of the '803 patent illustrates the difference between receiving time slots and other time slots. The preferred embodiment of the patent is "described in a GSM mobile communications system." *Id*. at 4:20-21. In such a system, "the transmission and reception between a wireless communication device and a base transceiver station takes place in [eight] different time slots:"
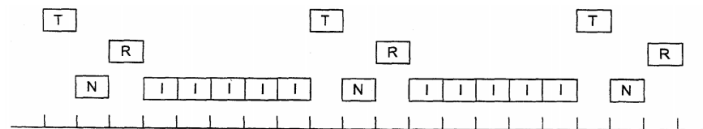
Fig. 2

Id. at Fig. 2; 4:28-30. The time slots designated "T" and "R" are for sending and receiving information to and from a mobile device. *Id*. at 4:20-45. And Fig. 2 shows six "I" or "idle" slots during which time no information is being transmitted to (or received from) the mobile device. *Id.*; Ex. P17, ¶ 34.

The intrinsic record makes clear that the information that a particular receiver receives during its receiving time slots—but does not receive in other time slots—are payload signals. Indeed, the specification and file history continually refer to ***payload*** signals or ***payload*** information as the information that is not being received when the reference signal is formed:

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- Ex. P5, Response to Office Action, dated 02/18/2003 (p. 3-4) (describing "[t]he present invention" as including a "control … based on a signal received when no actual payload information is being received");

- Ex. P6, Response to Office Action, dated 07/16/2003 (p. 5-6) ("The present invention presents a control for noise attenuation which is performed when no actual payload information is being received");

- Ex. P7, Response to Office Action, dated 01/12/2004 (p. 6-8) ("Thus, the control is not affected by payload information").

- Ex. P1, 3:16-18 ("formation of the reference signal … [is] performed during a time slot when no actual useful information is received[.]"); and

- Ex. P1, Preamble ("Thus, the control is not affected by payload information.").

Construing "information" as "payload signal(s)" thus reflects the patent's and the file history's use of the term "information" to refer to **payload** signals: "desired useful signals" received "in a receiving time slot R." *Id*. at 6:57-60.

The specification also emphasizes that data transmission (i.e., sending payload signals) is distinct from control signaling. Ex. P17, Russ ¶ 34. For example, the specification explains that "[t]he operation of the wireless communication device of the invention in other respects, e.g. data transmission and ***control signaling between the base station and the wireless communication device***, is known by a man skilled in the art, wherein it does not need to be discussed in more detail in this context." Ex. P1, '803 patent at 8:42-47 (emphasis added). As Dr. Russ explains, a POSITA would understand from this and the patent's related teachings that "the fact that the channel can be used either to transmit data ***or*** to transmit control signals is so well known in the art that it does not need further explanation." Ex. P17, Russ ¶ 34 (emphasis added). And a POSITA would also understand that, while the idle time slots for a particular mobile phone are not used to send payload signals to or from it—i.e., data transmission—they can be used for control signals. *Id*.

In fact, Xerox's construction of information to cover control signals as well as payload signals would exclude the 803 patent's preferred embodiment. As noted above, the preferred embodiment is directed to a system using the GSM standard (which formed a basis for "2G" communications). *Id*. ¶ 36. The GSM standard uses control signals called BCCH signals that are "continuously transmitted on *all* timeslots," even idle ones. *Id.*; Ex. P8, 1999 GSM Standard, Section 7.1. Because Xerox's interpretation of "information" includes control signals, and the BCCH control signals are "continuously transmitted on *all* timeslots," under Xerox's construction no timeslots would exist where no information is being received. Ex. P17, Russ ¶ 36. In contrast, American's construction would make clear that the idle timeslots are "moments in time . . . where no information [i.e., payload signal] is being received" by the phone and in which the reference signal could be formed, consistent with the preferred embodiment. Ex. P1, '803 Patent 7:8-10 ("The tuning of the receiver RX to attenuate interference is performed in an idle time slot I, preferably in an idle time slot N preceding the receiving time slot R."); Ex. P17, Russ ¶ 36. In other words, Xerox's construction incorrectly reads a preferred embodiment out of the claim that would otherwise be covered by American's construction. *See GE Lighting Solutions, LLC v. AgiLight, Inc.*, 750 F.3d 1304, 1311 (Fed. Cir. 2014) ("[W]here claims can reasonably be interpreted to include a specific embodiment, it is incorrect to construe the claims to exclude that embodiment . . . .") (internal quotations omitted).[4]

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[4] Other portions of the GSM standard confirm that the idle periods described in the preferred embodiment include signals that Xerox calls "information," making Xerox's construction inconsistent with the 803 patent's preferred embodiment. Ex. P17, Russ ¶¶ 37-39 (citing Ex. P8, 1999 GSM Standard at sections 6.1, 6.6.1.).

>   b.   ***Extrinsic evidence also confirms that "information" in this
>   context means "payload signal(s)"***

The extrinsic evidence also shows that, in this context, "information" means "payload

signal(s)." True, Xerox relies on Mr. Proctor's declaration as extrinsic evidence that

"information" also includes non-payload signals such as control signals. But Mr. Proctor's own

patents say otherwise.

For example, Mr. Proctor's patents explicitly confirm that "information" means "payload

signal(s)" in the mobile communications context. U.S. Pat. No. 6,400,317 to Rouphael *et al.*

specifically equates "informational signals" with "payload data." Ex. P9, '317 Patent 9:39-40

("neither receiving nor transmitting informational signals (also referred to as payload data).")

And that is true even when discussing an "idle period." *Id*. at 8:64-66 ("during idle periods

where the laptop computer 150 is neither transmitting nor receiving payload or informational

data via the antenna 100.").   U.S. Pat. No. 7,289,827 to Proctor et al. similarly equates

"informational data packets" with "payload data." Ex. P10, '827 Patent 9:13-15 ("If the

subscriber unit 60 is in the active mode (i.e. transmitting or receiving informational data packets,

also referred to as payload data)"); 8:27-29 ("during idle periods when the laptop computer 150

is neither transmitting nor receiving payload or informational data via the antenna 100.").

Mr. Proctor's patents likewise show that control signals differ from "information" in the

mobile communications context, using language strikingly similar to the 803 Patent's. Both Mr.

Proctor's '317 Patent and his '827 Patent refer to "a forward link pilot signal 190 that is

continuously [transmitted/sent] from the base station 160" to a mobile phone during times where

no "payload or informational data" is being received by the phone. Ex. P9, '317 Patent at 8:64-

66 ("during idle periods where the laptop computer 150 is neither transmitting nor receiving

payload or informational data via the antenna 100."); 8:66-9:3 ("When the subscriber unit 60 is

operating in this idle state, a received signal, for example, a forward link pilot signal 190 that is

continuously transmitted from the base station 160 and is received at each antenna element 101

through 105…"); Ex. P10, '827 Patent at 8:27-29 ("during idle periods when the laptop computer

150 is neither transmitting nor receiving payload or informational data via the antenna 100.");

8:29-32 ("During this idle time, a received signal, for example, a forward link pilot signal 190

that is continuously sent from the base station 160 and is received by each antenna element 101

through 105…").

> c.   ***Xerox's contrary arguments should be rejected***

Xerox, however, says that American's proposed construction is "contradicted by the

intrinsic and extrinsic evidence." Opening Br. at 3-7. But the only extrinsic evidence that Xerox

cites is Mr. Proctor's declaration. And Mr. Proctor's own patents in the field—as opposed to his

litigation-generated opinions—show that American's construction is correct. *See* section

IV.A.1.b, *supra*.

As for intrinsic evidence, Xerox rests most heavily on an argument that the file history

cited above actually hurts American's position. Xerox argues that this file history should be

ignored because "the patentee amended the claim to narrowly require forming of the reference

signal 'when no information is being received'[,] and did **_not_** amend the claim to recite 'when no

payload signal is being received' or 'when no ***payload information*** is being received.'" Br. at 6

(emph. in original).   But that is not the law. *See, e.g., Iridescent Networks, Inc. v. AT&T*

Mobility, LLC, 933 F.3d 1345, 1352-53 (Fed. Cir. 2019) ("We have explained that '[a]ny

explanation, elaboration, or qualification presented by the inventor during patent examination is

relevant, for the role of claim construction is to 'capture the scope of the actual invention' that is

disclosed, described, and patented.'") (quoting *Fenner Invs., Ltd. v. Cellco P'ship*, 778 F.3d

1320, 1323 (Fed. Cir. 2015)); and citing *Aptalis Pharmatech, Inc. v. Apotex Inc.*, 718 F. App'x

965, 971 (Fed. Cir. 2018)). The patentee's repeated assertions that "the present invention" involves a control performed "when no actual payload information is being received" should be given effect in interpreting "when no information is being received." *See id.*; *Pacing Techs., LLC v. Garmin Int'l, Inc.*, 778 F.3d 1021, 1025 (Fed. Cir. 2015) ("When a patentee describes the features of the 'present invention' as a whole, he alerts the reader that this description limits the scope of the invention.") (internal quotes omitted).

Xerox also claims that American seeks to "rewrite" the claim language to cover an accused method that forms a reference signal "when *some* information is being received," as opposed to the claim language of "when no information is being received." Opening Br. at 3, 7. Not so, and Xerox's argument mistakes the point in dispute. The question is not whether the claim language allows receiving "some information" instead of "no information" during idle time slots where the reference signal is formed. The question is whether "information" means "payload signals" to one skilled in the art (as American proposes), or something broader that also includes non-payload control signals (as Xerox proposes).

Importantly, the evidence discussed above shows that the idle time slots described by the '803 Patent are not idle with respect to all signals; instead, they are simply "moments in time in which *user data* is not being transmitted to or from the mobile station." Ex. P17, Russ ¶ 43. These slots are *necessarily* used to transmit control signals in the preferred GSM embodiment. *Id.* ¶¶ 36-39, 43. So Xerox's expansive construction of "information" to include those control signals simply does not work—because there would not be any time slots "where no information is being received," and in which the reference signal could be formed as in claim 1. *Id.*

In contrast, American's construction respects the '803 patent's distinction between "receiving time slots" and other moments "when no information is being received."   As Dr.

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Russ explains, the 803 patent makes clear "that there are time slots in which payload is being transferred to the mobile device and then there are other time slots that are usable for other purposes." *Id.* ¶ 44. Only American's construction reflects the '803 patent's teachings, the prosecution record, and the understanding of those skilled in the art.

B.   The Mody Patents

1.   "Multi-Input, Multi-Output (MIMO) … system" and "synchronizing the received frame with the transmitted frame in the time domain and frequency domain"

Disputed Terms	American's Construction	Xerox's Construction
Multi-Input, Multi-Output (MIMO) … system (Claims 1, 30 of the '782 Patent; Claims 2, 3 of the '304 Patent; Claim 20 of the '458 Patent)	plain and ordinary meaning	plain and ordinary meaning which is "a system having a receiver with multiple inputs and a transmitter with multiple outputs, wherein the multiple inputs of the receiver receive signals from the multiple outputs of the transmitter"
synchroniz[e/ing] the [received/demodulated] frame [to/with the transmitted frame] … in [a/both/the] time domain and frequency domain (Claims 1, 30 of the '782 Patent; Claims 1, 20 of the '458 Patent)	plain and ordinary meaning	Time synchronization: plain and ordinary meaning, which is "estimating the time of arrival of the transmitted signal/frame to determine the start time of the received frame" Frequency synchronization: plain and ordinary meaning, which is "correcting for the difference between the transmitter frequency and the receiver frequency"

American groups these terms together because they involve a similar dispute. The parties agree that each term carries its plain and ordinary meaning. But Xerox asks the Court to expressly construe these terms to define what Xerox contends that meaning is, solely in the guise of helping the jury understand these "highly technical" terms. Opening Br. at 9-10, 13-14.

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The Court should reject Xerox's proposal. Xerox has not shown that its constructions of these terms are correct, much less that they would help the jury. And even if the constructions might help the jury, such work should be done—if at all—much closer to trial.

a.   *Xerox's unjustified constructions would not help the jury understand these terms*

Xerox agrees that both terms should be accorded their plain and ordinary meaning, even expressly stating for the MIMO term that "the patentee did not act as its own lexicographer and there was no disavowal of claim scope in the specification or during prosecution." *See, e.g.*, Opening Br. at 9, 13. Xerox nonetheless proposes a construction for both terms, it says, solely because "a 'MIMO' system is a highly technical term that would not be understood by a jury" and "time and frequency synchronization of received and transmitted frames in a MIMO system are highly technical terms that would not be understood by a jury." *Id*. In each case, Xerox walks through preferred embodiments from the patents, and cites Mr. Proctor's declaration discussing the same embodiments. Opening Br. at 9-12, 13-16. But Xerox does not even try to explain why its constructions would be simpler for the jury than the terms themselves. They are not simpler, and they would not help the jury understand these terms.[5]

Although MIMO is an acronym, the claim term itself—"Multi-Input, Multi-Output (MIMO) . . . system"—spells out what MIMO stands for: "Multi-Input, Multi-Output." Each of the acronym's constituent terms are familiar to laypersons: "multiple," "input," and "output."

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[5] For example, Xerox cites a New York district court case to support the principle that "the Court needs to articulate the plain and ordinary meaning of [any highly technical] term to provide a "workable definition of what [the] claim term[] mean[s]" so that a "juror [can] apply the claim terms to the accused technology to determine infringement." Opening Br. at 9 (quoting *Web Tracking Solutions, L.L.C. v. Google, Inc.*, 08-CV-03139, 2010 U.S. Dist. LEXIS 143519, at *13 (E.D.N.Y. July 27, 2010). But Xerox fails to explain why it would be unworkable for the jury to apply these terms without express construction, especially with the benefit of expert testimony.

And the MIMO term primarily appears in the preambles of independent claims. So there are already claim elements that define what components the MIMO system must include. Ex. P17, Russ ¶ 60.

Xerox's proposal, however, effectively seeks to turn a preamble into a claim. Xerox's construction for "Multi-Input, Multi-Output (MIMO) . . . system" only *increases* any complexity of that phrase by unnecessarily adding other terms (such as "a receiver with multiple inputs" and "a transmitter with multiple outputs") and by requiring interaction between the two (specifically, "wherein the multiple inputs of the receiver receive signals from the multiple outputs of the transmitter.").

Xerox's extraneous language would not help the jury understand the "Multi-Input, Multi-Output (MIMO) . . . system" term. *Id*. At best, Xerox's definition duplicates elements recited in the body of the relevant claims. *See, e.g.*, Ex. P2, '782 Patent, Cl. 1 (reciting "a number (L) of receiving antennas for receiving the transmitted frames" and "L OFDM demodulators, each OFDM demodulator corresponding to a respective receiving antenna"). At worst, Xerox's definition introduces limitations that are not present in the claim term, and that Xerox concedes are not required by lexicography or disclaimer.

Likewise, Xerox's definitions of "time synchronization" and "frequency synchronization" would at best confuse, not help, the jury. For one thing, neither phrase appears verbatim in the disputed claim terms, and Xerox's definitions do not clearly reflect the claim language. Ex. P17, Russ ¶ 64. Xerox's definitions also inject concepts of "estimating the time of arrival of the transmitted signal/frame to determine the start time of the received frame" and "correcting for the difference between the transmitter frequency and the receiver frequency" into

the claim language, neither of which would be more digestible for a jury than the "synchronizing" term itself.

Xerox also does not square its proposed definitions with the ordinary meaning of "synchronize." That term has a broad ordinary meaning in the field. Ex. P15, Webster's New World Telecom Dictionary (defining "synchronize" as "[t]o cause objects or events to move together or occur at the same time."). But Xerox has not shown that its definitions convey the full scope of that term to a POSITA, as opposed to setting forth Xerox's view of specific synchronization methods used in embodiments. *See 3M Innovative Props. Co. v. Tredegar Corp.*, 725 F.3d 1315, 1329 (Fed. Cir. 2013) (explaining that when a claim term has an ascertainable ordinary meaning, "our cases do not support prescribing a more particularized meaning unless a narrower construction is required by the specification or prosecution history."). Nor has Xerox explained how its definition can be reconciled with the dependent claims that recite specific examples of how synchronization may be accomplished and show that the disputed synchronizing terms are not so limited. *See, e.g.*, '782 Patent claims 4, 5, 6, 7, 31 ("synchronizing in the time domain includes averaging estimates over a period of time"), 32 ("synchronizing in the frequency domain comprises estimating a frequency offset"), 33, 35, 36.

Finally, "synchronize" is a term familiar to laypersons. (No one is confused, for instance, when a TV announcer says "next up on NBC's Olympic coverage is synchronized swimming.") And the layperson's understanding of "synchronize" is consistent with its technical meaning in the art. *Compare* Ex. P15, Webster's New World Telecom Dictionary ("[t]o cause objects or events to move together or occur at the same time.") *with* Ex. P16, American Heritage College Dictionary ("1b. [t]o cause to occur or operate at the same time as something else").

>   b.   ***Even if construing the terms might help the jury, the Court should defer that question until closer to trial***

Xerox's argument also rests on a faulty premise: that it makes sense to construe terms at this early stage solely to help the jury understand them. In support of its argument that MIMO is such a difficult term that it must be expressly defined, for example, Xerox cites this Court's opinion in *Digital Retail Apps, Inc. v. H-E-B*, Civil No. 6-19-CV-00167-ADA, 2020 WL 376664 (W.D. Tex. Jan. 23, 2020). But that case rejected express constructions for the relevant terms, so it does not help Xerox's argument. *Id.* at *3.

This Court's opinion in *Digital Retail Apps*, in turn, cites Circuit Judge Bryson's opinion in *Kroy*. *Id.* (citing *Kroy IP Holdings, LLC v. Safeway, Inc.*, No. 2:12-CV-800-WCB, 2014 WL 3735222, at *2 (E.D. Tex. July 28, 2014) (Bryson, Cir. J., by designation). Although *Kroy* acknowledged that a court might construe a term solely to aid the jury's understanding, it rebuffed a request to further construe claim terms in a *Markman* order. Kroy, 2014 WL 3735222, at *2. Instead, *Kroy* concluded that the wiser path was to see how the case developed before construing terms simply for the jury's benefit:

> [T]he Court will consider any possible refinement in the claim construction ***as the case proceeds if it appears that the refinement would*** more accurately reflect the meaning of the claims or ***assist the jury in understanding them***. The Federal Circuit has made clear that a district court may adopt an "evolving" or "rolling" claim construction, in which the court's construction of claims evolves ***as the court better understands the technology and the patents at issue.***

Id. (emphasis added).

Other courts agree that construing claims solely to help the jury should be done, if at all, closer to trial. For example, as Judge Crabb remarked in an initial claim construction order, "[a]t this stage of the proceedings, the only disputes that must be resolved are ones relating to the presence of specific limitations in the claims, not the ability of a juror to understand the language." *AlmondNet, Inc. v. Microsoft Corp.*, No. 10-cv-298-bbc, 2011 WL 2214737, *1

(W.D. Wis. Jun.7, 2011). Judge Crabb added in *AlmondNet* that "I have learned that attempting

to sort out the exact words to use to define a term often leads to trouble." *Id.* (rejecting proposed

constructions for several terms and instructing the parties that "[i]f concerns arise before trial

about jury confusion, the parties can request specific language in limine.").

Thus, the Court should reject Xerox's attempt to unjustifiably construe these terms, and

allow them to bear their plain and ordinary meaning.

2.   "coarse time synchroniz[ing/ation]" and "fine time synchroniz[ing/ation]"

Disputed Term	American's Construction	Xerox's Construction
"coarse time synchroniz[ing/ation]" and "fine time synchroniz[ing/ation]" (Claims 5, 6, 7, 23, 30, 38, and 49 of the '782 Patent, Claim 4 of the '458 Patent)	Not indefinite; plain and ordinary meaning	Indefinite

Xerox claims that the "coarse" and "fine time synchroniz[ing/ation]" terms are indefinite,

but not because of any uncertainty about what "time synchronization" means to a POSITA.

Instead, Xerox's problem is with adding "coarse" or "fine" to "time synchronization." Those

additions render the terms indefinite, Xerox says, because "coarse" and "fine" are "terms of

degree," and the Mody Patents "provide[] no objective boundary to determine whether a

particular time synchronization is coarse or fine." Opening Br. at 16-17. Xerox is wrong.

The test for indefiniteness is whether "a patent's claims, viewed in light of the

specification and prosecution history, inform those skilled in the art about the scope of the

invention with reasonable certainty." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898,

910 (2014). The *Nautilus* test "mandates clarity, while recognizing that absolute precision is

unattainable." *Id.* "As long as claim terms satisfy this test, relative terms and words of degree do

not render patent claims invalid." *One-E-Way, Inc. v. Int'l Trade Comm'n*, 859 F.3d 1059, 1063

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(Fed. Cir. 2017). "[I]f the court concludes that a person of ordinary skill in the art, with the aid of the specification, would understand what is claimed, the claim is not indefinite." *Biosig Instruments, Inc. v. Nautilus, Inc.*, 783 F.3d 1374, 1381 (Fed. Cir. 2015).

Here, a POSITA would readily understand what is covered by the "coarse" and "fine time synchronization" terms. The Mody Patents consistently use "coarse" and "fine" as relative modifiers that distinguish between two time-synchronization steps or circuits, with the "fine" step or circuit being more precise or accurate than the "coarse" step or circuit. References cited during prosecution, as well as the patents of Xerox's own expert, confirm that "coarse" and "fine" have a well-understood meaning as relative terms. And case law makes clear that patents need not define terms of degree using numerical parameters to be definite.

<div align="center">

a.   ***The intrinsic evidence shows that a POSITA would readily understand what "coarse" and "fine" time synchronization mean***

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The terms "coarse time synchroniz[ing/ation]" and "fine time synchroniz[ing/ation]" appear in asserted claims 5, 6, 7, 23, 30, 38, and 49 of the '782 Patent, and claim 4 of the '458 Patent. (The terms also appear in several unasserted claims.) The asserted apparatus claims with these terms require both "a coarse time synchronization circuit" and a "fine time synchronization circuit"; the asserted method claims with these terms require separate steps of "coarse time synchronizing" and "fine time synchronizing." Claim 30 of the '782 patent exemplifies the latter:

> 30. A method for synchronizing a Multi-Input Multi-Output (MIMO) Orthogonal Frequency Division Multiplexing (OFDM) system in time and frequency domains, the method comprising the steps of:
>
>> producing a frame of data comprising a training symbol that includes a synchronization component that aids in synchronization, a plurality of data symbols, and a plurality of cyclic prefixes;
>>
>> transmitting the frame over a channel;
>>
>> receiving the transmitted frame;

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demodulating the received frame;

synchronizing the received demodulated frame to the transmitted frame such that the data symbols are synchronized in the time domain and frequency domain;

wherein the synchronizing in the time domain comprises ***coarse time synchronizing*** and ***fine time synchronizing***.

The specification explains at length how "coarse" and "fine" time synchronization work in preferred embodiments. Ex. P17, Russ ¶ 48. For example, Fig. 8 of the '782 and '458 patents (Exs. P2 and P4,) shows coarse and fine time synchronization circuits:
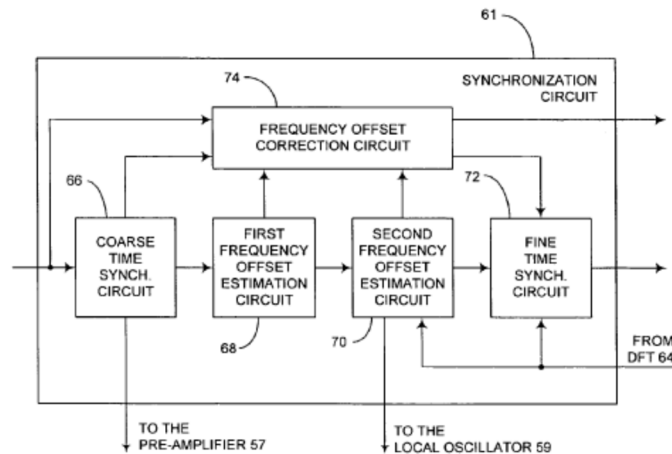

FIG. 8

In the embodiment of Fig. 8, for example, the coarse time synchronization circuit supplies enough time synchronization to make frequency offset estimation possible. *Id.* ¶ 49.

The specification confirms that the "fine" versus "coarse" distinction is a relative one, with the later fine timing adjustment producing a "***more accurate***" result than the earlier coarse timing adjustment. *Id*. ¶ 52 (citing Ex. P2, 13:37-45; 15:25-29 ("After the coarse time synchronization circuit 66 determines an approximate starting time, a ***more precise*** time synchronization is achieved by utilizing the fine time synchronization circuit 72.")).

The claims also use "coarse" and "fine" together to distinguish between two time-synchronization steps or circuits. In view of the specification, the internal structure of the claims

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clarifies the distinction: "fine time synchronization" is finer—i.e., more accurate or precise—than "coarse." Ex. P17, Russ ¶ 51. Because the terms are used together in the claims, a POSITA need not determine whether, standing alone, a particular time synchronization step or circuit is coarse or fine. The POSITA need only determine which of two time-synchronization steps or circuits is fine, and which is coarse.

Patents cited during prosecution of the Mody Patents also confirm that these are terms of art used in a relative sense that is well-understood to a POSITA. *Id*. ¶ 53. For example, U.S. Patent No. 6,137,847, entitled "Demodulating Digital Video Broadcast Signals," to Stott et al., states that "the timing synchronization in accordance with the invention consists of two processes, a coarse timing synchronization process and a fine timing synchronization process, as illustrated in FIG. 8." *See* Ex. P11, '847 Patent at 6:37-61. Stott is directed to a similar problem to that encountered in MIMO systems: decoding OFDM-modulated signals. Ex. P17, Russ ¶ 53. Stott uses the word "coarse" 91 times and the word "fine" 87 times, and even recites both words in its claims. *Id*. Notably, the patent repeatedly discusses both coarse and fine time synchronization without expressly defining the terms, because their meaning is clear to a POSITA in context. *Id*.

Likewise, U.S. Patent No. 7,110,350, entitled "Wireless LAN Compatible Multi-Input Multi-Output System," to Li et al., states that one of its objectives is to "obtain the coarse symbol timing" and that another is to obtain "the fine symbol timing." Ex. P17 Russ ¶ 53 (citing Ex. P12, 7:2-3, 60-62). As with other MIMO references, including preferred embodiments of the Mody patents, the fine symbol timing in Li occurs after frequency synchronization while the coarse occurs before—further showing that there is no difficulty distinguishing the two. *Id*.

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b.   ***Extrinsic evidence also shows that a POSITA would readily understand what "coarse" and "fine" time synchronization mean***

Extrinsic evidence shows that "coarse" and "fine" are well-understood terms used to distinguish a more accurate time-synchronization step or circuit from a less accurate one.

Xerox's expert, Mr. Proctor, has himself used "coarse" and "fine" timing language in at least two U.S. patents, further showing that these terms would be well known to a POSITA. *Id*. ¶ 54. Ex. P13, U.S. Patent No. 7,911,993, entitled "Method and Apparatus for Allowing Soft Handoff of a CDMA Reverse Link Utilizing an Orthogonal Channel Structure," to Proctor Jr., et al., actually claims a method including the step "following a coarse timing adjustment performed by the field unit based on the gross timing offset, calculating a fine timing adjustment based on a metric of the transmission path between the base station and the field units associated with a second received reverse link signal." Ex. P17, Russ ¶ 54.

Likewise, Ex. P14, Mr. Proctor's U.S. Patent No. 7,218,623, entitled "Coded Reverse Link Messages for Closed-Loop Power Control of Forward Link Control Messages," states that "[i]n addition to transmitting in the appropriate time slot, coarse and fine synchronization with the base station 25 renders it possible for a field unit 42 to receive information in its assigned time slot in the forward link." Ex. P14, '623 Patent at 18:15-18. The terms "coarse" and "fine" are at least as definite in the Mody Patents as in Mr. Proctor's patents. Ex. P17, Russ ¶ 54.

And though Xerox cites dictionary definitions for "coarse" and "fine," Opening Br. at 16, the definitions show that these terms are relative. "Fine" means "not coarse," coarse means "not fine," and fine particles are smaller than coarse ones. *Id.* ¶ 57 (citing Ex. D9). This confirms that the relative sense in which the specification and claims use "coarse" and "fine" matches how those words are understood by artisans and laypersons alike; there is nothing unusual or confusing about how the Mody Patents use them. As Dr. Russ explains, "[t]his is a situation

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where the technical jargon actually conveys meaning concisely to a non-technical person" as well as a POSITA. *Id.*

c.   ***Xerox's positions lack caselaw support***

Xerox offers several arguments why these terms are indefinite, but none has support in caselaw. And the cases that construe terms with "coarse" or "fine" actually support American.

Perhaps most notably, Xerox rests its position on an argument that there are no "objective boundaries" for these terms because the Mody Patents fail to "provide any example values or even ranges of values of" numeric parameters that would allow a POSITA to know precisely whether a time synchronization step or circuit was coarse. Opening Br. at 18. But the Federal Circuit has repeatedly held that patents need not define relative terms or terms of degree using numerical parameters to be definite. In *Biosig Instruments, Inc. v. Nautilus, Inc.*, for example, the Circuit acknowledged that the patent "d[id] not specifically define 'spaced relationship' with actual parameters, e.g., that the [relevant space] is one inch." 783 F.3d 1374, 1382 (Fed. Cir. 2015). "Nevertheless," the "spaced relationship" term was not indefinite because the intrinsic record "provide[d] sufficient clarity to skilled artisans as to the bounds of this term" so that "a skilled artisan would understand the inherent parameters of the invention. . . ." *Id.* at 1382-84 (reversing the district court's contrary conclusion); *see also One-E-Way, Inc. v. Int'l Trade Comm'n,* 859 F.3d 1059, 1066 (Fed. Cir. 2017) (rejecting the contention that the term of degree, "virtually free from interference," had to be defined in relation to a numerical amount of interference reduced, and explaining that "[f]or the purposes of definiteness, the term is not required to have a technical measure of the amount of interference.").

Here, that "coarse" and "fine" are well-understood relative terms eliminates any need to define them by numerical values. By way of analogy, a patent claim for a bicycle with one larger wheel and one smaller wheel would not be indefinite for failing to specify the cutoff

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between large and small wheels. Rather, the claim merely requires that the wheels be of unequal sizes. Likewise, a patent claim for a microscope with a coarse adjustment knob and a fine adjustment knob need not specify the precise dividing line between coarse and fine adjustments. The claim simply requires that the knobs provide greater and lesser levels of adjustment. And even though microscopes have different maximum magnification levels, no one would be confused by an instruction to first use the microscope's coarse adjustment knob to find the general area you want to look at, and then using the microscope's fine adjustment knob to focus more closely on one part of that area. In other words, the claim terms in dispute here ("fine" and "coarse") are not used as independent absolutes. They are defined *relative* to each other. Ex. P17, Russ ¶ 51.

Xerox also says that the indefiniteness of these terms is heightened by the *possibility* that what was "'fine' time synchronization . . . when the Mody patents were filed" may "no longer be considered 'fine'" today. Opening Br. at 21 (citing Proctor ¶¶ 62-64). Xerox does not show or even say that the meaning of this term in the art has actually changed, though. No matter— Xerox's speculation is irrelevant: "[D]efiniteness is measured from the viewpoint of a person skilled in the art *at the time the patent was filed*." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 908 (2014) (italics in original).[6]

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[6] But even if a modern system's coarse timing adjustment might be finer than the older system's fine timing adjustment, Xerox's hypothetical would still be misleading. *Id*. In the hypothetical comparison, a modern system's coarse timing adjustment might be finer than the older system's fine timing adjustment. But the patent claims do not attempt to compare one system's fine timing adjustment to that of a different system or to some absolute standard of "fine." Ex. P17, Russ ¶ 56. Rather, the comparison between "fine" and "coarse" is completely internal to the claim structure. *Id*. The claimed system requires two types of timing adjustment, one that is "coarse" and one that is "fine", with the boundaries of each term defined in the context of the other. *Id*.

Finally, Xerox cites several cases about terms of degree generally, but not any case that holds a term with "coarse" or "fine" to be indefinite. Opening Br. at 16-22. And for good reason. There are many cases construing terms that include the words "coarse" or "fine" without finding them indefinite. Indeed, in *Metalcraft of Mayville Inc. v. The Toro Co.*, a court construed the terms "coarse-stiffness adjuster" and "fine-stiffness adjuster" together. Case No. 2:16-cv-544, Dkt. No. 132 (E.D. Wisc. Jan. 3, 2018) (construing "coarse-stiffness adjuster" as "an adjuster for modifying stiffness in relatively large or approximate increments" and construing "fine-stiffness adjuster" as "an adjuster for making relatively small or precise changes to stiffness."). Some cases have even squarely rejected indefiniteness arguments for terms including the words "coarse" or "fine." *See, e.g.*, *TQ Delta, LLC v. Comcast Cable Communications, LLC*, C.A. No. 1:15-cv-00611-RGA, 2016 WL 7013481 at *8 (D. Del. Nov. 30, 2016) (construing "fine gain parameter" to mean "parameter used to determine power level on a per subcarrier basis" where term was understood by a POSITA, and rejecting defendants' argument that "'fine' is a word of degree and, therefore, this term is necessarily indefinite."); *Certain Digital Cameras, Software, and Components Thereof*, Inv. No. 337-TA-1059, Comm'n Opinion, 2018 WL 11245078 at *117 (U.S.I.T.C. Aug. 17, 2018) (construing "coarse motion vector" and rejecting argument that claim term was indefinite).

Xerox thus has not shown by clear and convincing evidence that these terms are indefinite, so the terms should bear their plain and ordinary meaning.

V.   **CONCLUSION**

For the foregoing reasons, American respectfully requests that this Court adopt American's proposed constructions and reject Xerox's proposed constructions.

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Dated: February 14, 2022

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